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'THE EXTENSION OF MIND': COMMENTS ON DR J. R. SMYTHIES'S PAPER

I

BY H. H. PRICE

Philosophical readers of Dr J. R. Smythies's very interesting and provocative paper on 'The Extension of Mind' in the September 1951 issue of this *Journal* can hardly fail to feel uneasy about some of his contentions ; and in this note I propose to mention some of the difficulties which are likely to occur to them. But I should like to say at once that these difficulties must not be taken too seriously. If Dr Smythies's theory turns out to be an effective tool of research, by all means let us use it as such, whatever epistemological difficulties there may be in it. He claims himself, in the last sentence of his paper, that the theory 'suggests a series of experimental investigations not only for parapsychology but also for physics' (p. 502). If he is right, let us get on with these experimental investigations. The epistemological mess can be cleared up afterwards.

In any case, I suspect that the most important and valuable part of his theory is logically independent of the epistemological doctrines which I shall criticise presently. If they are false, it might still be true that there is a psyche or psychical mechanism distinct both from the self and from the brain ; that this psychical mechanism is spatially extended ; and that the space in which it is extended is distinct from physical space, but included along with physical space in a single seven-dimensional manifold. It is true that this idea of a spatially extended psychical mechanism is not wholly original. The Sankhya philosophers of ancient India suggested something very like it some 2,500 years ago. They held that the mind, as opposed to the Self or 'Witness', is an extended and material entity, different from the physical organism. But, of course, they did not have the technical resources of modern geo-

metry at their disposal, as Dr Smythies has. It may well be that this has enabled him to reformulate an ancient idea in a novel and experimentally-testable form.

After these prefatory remarks, designed to warn the reader against taking my criticisms too seriously, I proceed to mention one or two difficulties which I find in Dr Smythies's theory as it stands.

The first concerns the status which he assigns to the human nervous system ('signalling mechanism') or rather to our knowledge about it. The science of neurophysiology appears to have a privileged and almost sacrosanct position in his theory. The trouble, of course, is that human sense-organs and nervous systems are themselves parts of the physical world. But, according to the theory, no scientist, no matter who he is, has any direct access to the physical world ; and in this respect physiologists are no better off than other people. All that any scientist can directly observe is his own *perceptual* world. 'Physical space and physical objects are in fact hypotheses, as we can never observe them directly' (p. 485 *ad fin.*). But then the human nervous system and its signalling mechanism is itself only a hypothesis. Or can it be that physiologists, at any rate in their working hours, are entitled to accept the Naïve Realist TNS theory, though nobody else is entitled to accept it? Do they have a direct access to the physical world itself, which nobody else has? I am sure that Dr Smythies would not seriously say so. In other places he carefully distinguishes between the perceived body and the physical body. Yet when he is writing about neurophysiology he seems to forget this distinction. He writes as if physiologists were directly aware of the *physical* bodies of other human beings. And if after all they are not, if they can only study their own percepts, and all the detailed information they give us about the structure and working of *physical* nervous systems is only a set of hypotheses, how are these hypotheses arrived at, and how are they justified?

I have said that human sense-organs and nervous systems are themselves part of the physical world, and most people would agree that this proposition is not only true, but platitudinously true. Yet there are passages when Dr Smythies seems to deny this platitude, by implication at least. He says more than once that the 'signalling mechanism' of the nervous system is *between* the physical world and the perceptual world (cf. p. 489). The word 'between' implies that the signalling mechanism itself belongs to neither of these worlds. This might be said of the psychical part of the signalling mechanism, though doubtfully, since we are told elsewhere (p. 492) that it is located in the space

of the perceptual world. But it plainly cannot be said of the physiological part, which is certainly in the physical world if anything is. If the word 'between' is to be used, the physiological part of the mechanism is between one part of the physical world and another, e.g. between environmental objects outside the percipient's skin, and his cerebral cortex which is inside it. And despite this betweenness, or rather because of it, it is itself as physical as the wires 'between' an electric light bulb and an electric battery.

I am not of course suggesting for a moment that we ought to go back to the TNS theory of 'common sense'; and I agree with Dr Smythies that Professor Ryle and other philsophers of his school are much too common-sensical in this respect. I am only suggesting that the difficulties which arise when the TNS theory is rejected should be fairly and squarely faced, and complaining (I hope not unjustly) that Dr Smythies has not faced them. To put it crudely, it seems that the physical world (including those parts of it which neurophysiologists investigate) is something less than an object of direct awareness, but at the same time something more than a mere hypothesis.

I now turn to another difficulty, or perhaps another aspect of the same one. There is a curious passage on page 496 about the barrier which prevents the experimenter from entering mind's private world, and I think that Dr Smythies himself attaches considerable importance to it. The experimenter, he says, cannot enter mind's private world 'not because it does not exist, but because of the barrier presented by a dimensional interface' (cf. also p. 500 *ad fin.* and p. 502). Here it looks at first sight as if the experimenter must be observing the *physical* world: for the dimensional interface, it would seem, is between the physical world and the perceptual world, both of them being included in one seven-dimensional continuum. If that is the right interpretation, the difficult is the one already mentioned, that scientists who study the signalling mechanism somehow have a direct access to the physical world which other people lack.

But another interpretation is possible. Perhaps this dimensional interface, 'the most impenetrable of all barriers' (p. 500), is not between the physical world and the perceptual world, but between two perceptual worlds—the perceptual world of the experimenter and the perceptual world of the other percipient whom he is investigating. This would be consistent with what Dr Smythies insists on elsewhere, that his own percepts are the only entities which an experimenter (or anyone else) can directly observe. But in that case Dr Smythies's total universe, including *both* percepts

and physical objects, must be far more complicated than he wants it to be. Seven dimensions will be far too few. We shall need dimensional interfaces not merely between the physical world and 'the' perceptual world, but between the physical world and *each* perceptual world ; and there will be as many perceptual worlds—and perceptual spaces—as there are percipients. Not only so. We shall also need dimensional interfaces between each perceptual world and every other perceptual world ; for instance, between your perceptual world and mine, if you are the experimenter and I am the person experimented upon.

To put it another way, it would seem that on Dr Smythies's assumptions there is no such thing as 'the' perceptual world at all, though there is such a thing as 'the' physical world, or at any rate we may entertain the hypothesis that there is. It would seem that there must be many perceptual worlds, and many perceptual spaces, each of them private to the percipient who perceives it. And as for the physical world, it is not exactly public either, though it could be called neutral as between all the different percipients. To call it public would suggest that it is *observed* by all of them, as the ordinary man, of course, believes that it is ; but on Dr Smythies's assumptions it cannot be, because it is not observed at all.

This privacy of perceptual worlds makes it very difficult for Dr Smythies, as for Berkeley, to explain how different percipients can communicate with one another, or indeed how one percipient can learn, or even suspect, that other percipients exist. Like Berkeley, he seems to be in grave danger of Solipsism. I think it is incumbent on him to explain how a public perceptual world ('the' perceptual world) extended in a public perceptual space, is constructed, or postulated, when each of us has direct access only to his own private one. Or does each of us first arrive at the hypothesis of a *physical* world (however he justifies it) and then proceed from this to the further hypothesis that there are other *perceptual* worlds correlated somehow with his own? Whatever the right answer is, this problem of the privacy of perceptual worlds and perceptual spaces should surely be looked into. Incidentally, there is some difficulty in understanding how even one person's private perceptual space is constructed. If we stick to the bare data, it would appear that visual space and tactual space are different. Before I can be aware of perceptual space, even a private one, I must somehow correlate the two.

Moreover, Dr Smythies's treatment of the space of mental images (p. 486) seems to be much too simple. It is true that there are 'projected' mental images, and there are eidetic images. No doubt we can find room for these in perceptual space, or at least in

visual space. (Dr Smythies's imaged lines sketched 'round the objects of our perceptions' seem to be a special sort of projected visual images.) But there are many visual images which are neither projected nor eidetic. They certainly have spatial properties, but they seem to be 'in a space of their own', which is neither perceptual space nor physical space. The same is true of at any rate some visual hallucinations (when the percipient's entire visual field is hallucinatory, and not merely a part of it). And what about dream images? Dr Smythies has not mentioned them at all. Yet it is quite plain that no student of telepathy and precognition can afford to neglect them, even if others can. Dream images, too, seem to be located 'in a space of their own'; moreover, even if we confine ourselves to the experiences of a single dreamer, there are no discernible spatial relations between the dream image I have tonight and those I had yesterday night.

It would seem, then, that Dr Smythies's theory of space, ingenious as it is, is much too neat and tidy. But here I would venture to remind the reader of what was said in the second paragraph of these notes. I would suggest that the most fruitful and original part of his theory is the part concerning the psychical mechanism, and I do not believe it was necessary for him to go into the problems of perceptual space at all. By all means let us carefully consider his hypothesis that there is a spatially extended psychical mechanism. And in so doing, let us carefully consider his very helpful suggestion that the space in which it is located is not physical space but another one, separated from physical space by a 'dimensional interface', and included along with physical space in a total seven-dimensional continuum. But granting that the psychical mechanism is not in physical space, does it follow that it *is* in perceptual space, as Dr Smythies seems to say on p. 492, sub-paragraph (v)? Not in the least, and the suggestion is most unplausible. For if it were true, one would think that every percipient ought to be able to perceive his own physical mechanism, since after all it would be somewhere or other in his perceptual world; and notoriously no percipient is able to do this. Of course, Dr Smythies can maintain that the psychical mechanism is the proximate cause of our percepts and therefore of their spatial properties, since it is the last link in the causal chain by which they are generated. But it will not follow from this that it is *spatially* related to the percepts which it causes.

There are many other points in Dr Smythies's paper which call for comment, for instance his 'like to like' theory of causation (pp. 493, 500) and his very surprising estimate of the philosophy of Descartes (pp. 492–3). I will mention only one, because it seems to be crucial for the understanding of his theory. At the top of

page 488 he says we must postulate that 'minute *physical* forces cross the interface in either direction' (my italics) and identifies these forces with $\Psi\kappa$ and $\Psi\gamma$. If I understand his theory rightly the word 'physical' here is just the wrong one. For surely these forces are not confined to the physical part of the seven-dimensional continuum ; they belong in a way to both parts at once, and indeed that is the whole point of postulating them. If they were just physical, they could not cross the interface. A few lines below he calls them 'trans-dimensional physical forces'. It seems to me that 'trans-dimensional' is the right adjective, but 'physical' is the wrong one.

II

By Robert H. Thouless

One of the most obvious needs of parapsychology is the formulation of hypothetical systems which will lead to expectations that can be tested by experiment. In judging any suggestion that may be made, the first question to be asked is not whether it is true or false but whether it is likely to be experimentally fruitful. Dr Smythies's ingenious speculation seems to offer good hope of proving fruitful in suggesting directions of experimental inquiry. It seems to me, therefore, to be deserving of a welcome. The first welcome we can give it is by discussing it, but the best tribute we can pay it in the end is to test its expectations experimentally.

I agree with Dr Smythies that the first thing to get out of our minds is what he calls the 'transparent nervous system' theory. The name is new, but the inadequacies of the theory have been obvious to experimental psychologists for many years now. I have criticised it in my own lectures under the name of the 'transmission theory', and it is very much what Köhler means by the 'constancy hypothesis'. For this reason, experimental psychologists have given up the use of the term 'sensation' as the name for an element of experience, and they talk rather of 'sensory cues' implying that what happens to a sense-organ is not transmitted as such to consciousness but acts as a signal or cue to set off an appropriate perceptual response.

I am not sure that Dr Smythies is always just in regarding the passages he has quoted from Einstein and others as necessarily implying the TNS theory. I think they could be otherwise interpreted. Whether it is so or not, however, the TNS theory is taken for granted by most physicists and old-fashioned physiologists and is probably part of the unexamined structure of what is taken for granted in the mind of the man in the street. And it

must be got rid of if we are to begin to talk sense about the perception of the world around us.

The main novel point of Dr Smythies's theory is, as I understand it, that one can represent the relationship between physical space, time, and psychical space, as a seven-dimensional system with one dimension for time and three each for the two space systems. I am not sure whether he would accept my phrase 'one can represent'; it is intended to imply that this is a way of looking at these things, not a fact that can be extracted from them. Furthermore, he contends that if we use this conceptual system many of the difficulties both of paranormal psychology and of the 'mind-body problem' of normal psychology disappear. This is an idea which seems to promise well as a guide to experimental inquiry. Its test as a fruitful hypothesis must be whether it proves possible by its means to pose questions sufficiently precisely to make them verifiable by the method of experimental test.

III

By C. W. K. Mundle

I SHALL discuss two features of Dr Smythies's stimulating paper 'The Extension of Mind', the first being the theory of perception which he adopts as his starting point. This is what philosophers call 'the representative theory of perception', and it is nowadays widely regarded by them as untenable. Dr Smythies dismisses as a fallacy the common-sense view, which is usually labelled by philosophers 'Naïve Realism' or 'Direct Realism', and is rechristened by Dr Smythies 'the TNS (transparent nervous system) fallacy'. Regarding the common-sense view—'thinking we are looking at the physical world directly'—Dr Smythies says 'we are no longer allowed to do this by neurophysiology' (p. 485). I suggest, however, that he is mistaken in thinking that the discoveries of physiologists have demonstrated the falsity of the common-sense view. He seems to take for granted a certain theory about the function of such trains of events as light-waves impinging on a retina, followed by processes in the optical nerve and the brain. He assumes that their function must be to create private mind-dependent entities—'objects in perceptual space' (or 'sense-fields', to use a philosophers' term). But their function may, for all the physiologists can show, be quite different; it may be selective rather than creative, i.e. their function may be to direct one's attention to this rather than that part or feature of the public physical world, to put us, so to speak, in 'direct contact' with objects which are not mind-dependent The selective

interpretation is certainly not without its difficulties (see, for example, Professor Broad's discussion in *Scientific Thought*, p. 523 *et seq*). But Dr Smythies does not seem to be fully aware of the formidable difficulties of the representative theory. The basic difficulty is that if we maintain, like Dr Smythies, that we can only observe 'objects in perceptual space' (or private sense-fields) how do we, how could we, verify the existence of physical objects in physical space. Sometimes Dr Smythies seems to be acknowledging this difficulty, as when he says 'Physical space and physical objects are in fact hypotheses, as we can never observe them directly' (p. 485). But frequently he speaks, as he is not entitled to, as if we *know* facts about physical space. He assumes, for example, that we know that the observed relations within sense-fields are faithful reproductions of their physical causes (see pp. 486-8).

I have been making what is a stock criticism of the representative theory of perception. Locke's version of this theory was criticised on such lines by Berkeley, who realized that if Locke were right in holding that one is only acquainted with mind-dependent entities, then it is an arbitrary and unnecessary hypothesis to assume physical objects as the causes of our sensations. It is simpler and more intelligible, Berkeley concluded, to assume that all our sensations are produced directly by God.

I am certainly not suggesting, however, that Dr Smythies's theory should be rejected out of hand because it is based on the representation theory of perception. We should be obliged to reconsider the case for the representative theory *if* Dr Smythies's theory of mind proved more successful than any of its rivals in reconciling psi phenomena with what is known about normal perception. And certainly the rival theories which Dr Smythies considers (Descartes' and Ryle's) seem to contribute little to this end. Professor Ryle's approach, in making Common Sense the final court of appeal and in seeking to dispense with private mental occurrences, seems likely to resolve our problem only by inducing us to forget that psi phenomena demand some explanation.

What I want to discuss next is the way in which Dr Smythies's theory is supposed to help us to explain psi phenomena. I do not find Dr Smythies's paper very explicit on this point. I shall take it that the main puzzle about psi phenomena is that they apparently involve 'action at a distance' (i.e. causal dependence between events separated by a spatio-temporal gap, not attributable to a chain of intervening events). How does Dr Smythies's theory help us here? According to his theory both the physical world and a mind are four-dimensional, having only one dimension (time) in common. A mind is supposed to *comprise* its sense-fields (or perceptual objects), and as these are extended in three spatial

dimensions, a mind is said to be *material* (though not *physical*). The feature of Dr Smythies's theory which I find most difficult to understand concerns the relationship which is supposed to exist between

(*a*) the trio [1] of dimensions belonging only to sense-fields, and

(*b*) the trio of dimensions belonging only to the physical world.

Some of Dr Smythies's statements suggest that there are spatial relations between (*a*) and (*b*), as when he says 'the differentiation of psyche from brain should be made on the basis of *different geographical location* (p. 495; his italics); and again when he speaks of $\Psi\gamma$ and $\Psi\kappa$ as 'minute trans-dimensional *physical* forces' (p. 488; my italics). But judging by what he says on page 492, Dr Smythies wishes to deny that there are any spatial ('topological') relations between (*a*) and (*b*). (And this seems an intelligible view, for we would, I think, deny that there are any spatial relations between the space belonging to the contents of a dream and perceptual space.) On this interpretation, Dr Smythies could, I think, claim that our problem concerning action at a distance evaporates. For his theory would imply that it is meaningless to speak of a distance (a spatial or spatio-temporal gap) between any mental event and any physical event; and all cases of psi phenomena could, I think, be interpreted as involving one or more transactions between mental and physical events.

There is, however, a serious snag. For this theory would leave us with an apparently insoluble puzzle concerning *normal* phenomena. If there are no spatial relations between a person's sense-fields and his physical body, why, under normal circumstances, should a mind directly affect (and be directly affected by) one and only one segment of the physical world—the brain of the body which it 'animates'? It seems to me that, on this interpretation, Dr Smythies's theory would remove our main puzzle about the paranormal only at the cost of making the normal inexplicable. I do not know whether Dr Smythies has considered his theory from this angle. If he has, I think he was dismissing it too lightly when he said '$\Psi\gamma$ and $\Psi\kappa$ . . . are normally focussed upon the brain, but have a "penumbra" which would be responsible for ESP and PK' (p. 490).

Dr Smythies may feel that I have been wantonly ignoring what he says in his final summing-up—'The three dimensions comprising the manifold of mental position (perceptual space) are at right angles to the four dimensions of physical space-time' (p. 501). I find it very difficult, however, to see what could be meant by speaking of spatial manifolds being 'at right angles to' each other.

[1] Or should I say 'trios'? Does each mind have a *different* trio of space-dimensions?

This is presumably due solely to my mathematical incompetence ; but I still want to ask those who find this theory clear whether it can explain the intimate relations which exist between our minds and our bodies.

IV

By C. C. Stevens

In his opening paragraph Dr Smythies writes :

> The following important fact has been established by experiment. The mind is able to abstract information from its present and future environment without the use of any of the recognized channels of sense.

Unfortunately for the argument advanced, no jot of evidence requires observed phenomena to be described as entailing the existence of 'mind'. If Dr Smythies is satisfied with the implications of his statement on p. 478 that 'Nothing resembling transmitting apparatus has been found in the brain', then he should also recognize that nothing resembling 'mind' has ever been found anywhere.

One can agree with much that he says, particularly (p. 500) :

> (i) That the psyche is merely a noun descriptive of certain complex . . . processes in the brain. . . . We can say all that we wish to say without using the word at all.

It is remarkable that Dr Smythies makes no further reference to this theory. He quotes a second theory and expands on its deficiencies but is silent about this one. Such behaviour bears all the marks of an unconscious assumption. Like so many other psychical researchers and innumerable ancestors and contemporaries, Dr Smythies has assumed, unconsciously and therefore involuntarily, there must be a 'mind' around the place somewhere. The presence of the term in the language he learned in his cradle is sufficient to inculcate the assumption surreptitiously, and its adoption is confirmed and made a fixed habit by subsequent conversation with others also in its grip. Once the existence of 'mind' is postulated, then the difficulties and confusions listed so exhaustively by Dr Smythies necessarily follow. On that postulate, of course 'mind' must have some extension or 'whereness' ; of course, it may be distinguished from brain 'on the basis of different geographical location' ; of course, it is reasonable to regard the brain then as 'but a station on the way to the soul'. If you assume, without knowing you are doing so, that every game includes scoring runs, your interpretation of a tennis tournament will be confused, to put it mildly. As long as you continue to be unaware of your assumption and of its effects on your interpreta-

tion of every aspect you observe in the match, so long will you automatically think tennis-players should see the folly of their ways and that it was time the rules were altered. Dr Smythies's remarks about the Crisis in Knowledge and the Crisis in Physics follow from his assumption, but not from anything else.

Though Dr Smythies is in excellent company, in my view the situation is the more deplorable. He writes (p. 500):

> As this theory [No. (ii)] has been in the field for as long as history has been recorded, there does not seem to be much hope. . . .

I regard this remark as apposite to all theories erected on a postulated, and hitherto undetected, 'mind'. It is not generally recognized that the theory (i) quoted above represents, not merely a relation between 'mind' (=psyche) and brain, but a new epistemology, a new recognition of the relations between three distinguishable states, viz. (*a*) the world around us, (*b*) our experience of it, and (*c*) what we say about our experience. In the traditional epistemology these three have been either (1) identified, e.g. 'I'm telling you exactly what happened', no distinction being made, or (2) regarded as in one-to-one correspondence with each other, e.g. Out there is a pebble_a, inside my skin is my cognition_b of the pebble_a ($a : b = 1 : 1$) and I can say $[\text{That is a pebble}]_c$, my remark_c being apparently related one-to-one to my experience_b ($a : b : c = 1 : 1$). The slightest acquaintance with nervous system function renders this view untenable and in its place is required a new epistemology postulating, not one-to-one, but many-to-one relations between *a*, *b* and *c*. When this was adopted, whether consciously or unconsciously, new theories became possible, in physics, biology, communication, neuropsychiatry, etc., but such new theories admittedly cannot be made sense of, or understood, by anyone still employing—as a matter of unconscious habit—the ancient epistemology we have inherited from Neanderthal Man.

There is no reason why the new epistemology should not also be used to formulate new and more effective theories of psi phenomena, provided that psychical researchers will train themselves in the novel and largely unfamiliar technique.

V

By Antony G. N. Flew

A

'The mind is able to abstract information from its present and future environment without the use of any of the recognized channels of sense' (p. 477). Rightly Stevens [1] picks out this sen-

[1] Mr Stevens sent a copy of his comments to Mr Flew.—Ed.

tence as crucial. It is supposed to express a 'fact . . . established by experiment' (p. 477). And indeed so it does: but only provided that it is interpreted as equivalent to the statement that some people have ESP capacity. But if it is to be interpreted (and this must surely be how Smythies means it: or else why does he think that psychical research is relevant to his theory?) in a different way, as stating that 'the psyche . . . a potentially independent agent . . . in control of the brain' (p. 500) picks up this information it most certainly does not express a fact, experimentally established. Indeed it is hard to see how this fact—if fact it be—ever could be established, if psyches—those putative so long elusive objects—are really to be found only (as Smythies suggests) 'on the other side of the most impenetrable of all barriers, a dimensional interface' (p. 500).

Clearly something is going wrong: and it is—as Stevens claims—something quite fundamental to the entire theory. I suggest that the trouble arises mainly from two mistakes: *first*, Smythies misconstrues the word 'mind' and its associates; *second*, he confuses enquiries about the meanings of words with investigations of the facts about things.

There are in the English language (and indeed in innumerable other languages) many picturesque and suggestive 'mind'-idioms. We speak of Miss Helen Keller's achievement as a triumph of mind over matter, of Sir Stafford Cripps as having an absolutely first-class mind, and of the perfect co-ordination of body and mind displayed by a ballerina. Such idioms suggest that the word 'mind' refers to an object, as does the word 'brain'. Though of course to an unfindable object; whose elusiveness has to be excused by explaining that it is invisible and immaterial, or concealed behind a 'dimensional interface'. But this is a mistake. 'Mind' is not that sort of word: it is much more like the word 'temper' which—*pace* the Red Queen—does not denote an object at all. The meaning of 'mind' expressions can be rendered adequately into talk of the things which people can do and feel and understand, talk which suggests no elusive objects. To say that a man has a third-class mind is not to say that he possesses some clandestine organ, unhappily rather defective; but to say that his academic ability is very slight. Disputes about such assertions are settled—if they are settled at all—by examining his capacities; and not by investigating his problematical shadow anatomy. I will not labour the point here; for I have recently developed it elsewhere[1] against Rhine; and in any case Smythies also knows his Ryle (cf. pp. 494 ff.).

[1] 'Minds and Mystifications' printed in the *Listener*, 27 September 1951.

Nevertheless it does seem that he fails fully to appreciate the force and relevance of Rylean theses. For instance, he suggests that Ryle's proceedings are arbitrary: writing of his 'defining mind to mean a verbal cloak to cover such processes as thinking, perceiving, feeling, etc.'; and conceding 'It is, of course, meaningless to discuss whether the "mind" is extended or not if by mind we mean what Ryle means by the word' (p. 493: his inverted commas; and lack of them). He also assumes (and for this Ryle's mode of expression [1] is probably to blame) that Ryle is just appealing to commonsense. But this is wrong. Ryle is not just being arbitrary here: for he is using the word 'mind' in the accepted way. Nor is he here appealing primarily to commonsense (which indeed is notoriously 'a most misleading guide' (p. 494) about the facts of nature). He is appealing—and this is a very different matter—to common linguistic usage, as the standard of correctness in speech. Neither is this trivial or irrelevant to the present theory. For it is surely only by unwittingly slipping to and fro between the ordinary and correct interpretation of 'mind'-expressions (which he thinks of as an arbitrary invention of Ryle's) and his peculiar and mistaken one (which he presumably takes to be correct) that Smythies is able to persuade himself that the ESP phenomena prove, or even tend to prove, that psyches, conceived as potentially independent agents in control of the brain, pick up information, or even exist at all. To put it crudely: Smythies interprets the sentence quoted in our first paragraph in one way—the correct way—when he is establishing that it expresses an experimental fact; but in a wholly different—and mistaken—way when he goes on, assured that it expresses a fact, to erect his theoretical structure upon the alleged fact which it is now supposed, wrongly, to state.[2] It is unkind, but irresistibly apposite, to quote his own warning that 'Confusion is caused by the use of the words ... "mind" and "psyche". These words have several different meanings, and the confusion arises when deductions are drawn ... when one of the other meanings of the words is really intended' (p. 479).

We turn now to the second sort of mistake, the confusion of problems of meaning with problems of fact. Smythies notices

[1] In *The Concept of Mind* he often makes his points as if his business were with the non-linguistic world rather than, as it is, with words or concepts. His paper 'Systematically Misleading Expressions', reprinted in my anthology *Logic and Language* (Oxford, Blackwell, 1951) gives a better idea of his method, and would be suggestive here.

[2] This may also suggest why Rhine now seems unable to make up his mind—in spite of his earlier certainty—whether parapsychology has as yet experimentally established the existence of any sort of soul (cf. *Telepathy and Human Personality, passim.*).

two theories of 'the possible nature of the psyche' (p. 500). But the first is about the meaning of the word 'psyche' : while the second is a speculation about the nature of psyches, the things which the word 'psyche' is thought by some to denote. He thus bundles together two radically different sorts of question. This is all too easily done : for unfortunately both can be asked in the same form of words 'What is (the nature of) (an or the) X?' ; which may express a question about the meaning of the word 'X'; or about the nature of the things, X's, which the word denotes. But it is essential to distinguish these two sorts of question : which is perhaps best done by putting inverted commas round the word when it is a word that is being mentioned (hence my petulant parenthesis about Smythies's faulty inverted comma-ing). When this distinction is made, it becomes clear first that questions about the nature of the objects, psyches, can only arise if there are such objects and, second, that the existence of these putative objects is neither guaranteed by our ordinary significant use of 'mind'-idioms nor yet established by the extraordinary discoveries of parapsychology. Once it has been shown that neither of these gives grounds for believing any such entities to exist, it is difficult to justify further speculation about their possible nature and location (cf., e.g., p. 500 at foot).

Another but much more subtle and complicated example of the same sort of confusion can be found in the attack on 'the commonsense fallacy of the TNS' (p. 494) : which consists in supposing that 'the familiar world of perception is . . . a *direct* view of the physical world' (p. 480) ; and ignoring that we are all wholly dependent for our knowledge of things on 'an extensive signalling mechanism' (p. 481), the nervous system. This cannot be relied on to be perfect, perfectly transparent as it were. It may be mechanically defective : and its operations can at best permit us to put forward the very existence of the world only as an hypothesis. Smythies, following a great tradition, but adding all modern technological sophistications, pictures our human cognitive predicament on the analogy of 'the controller in the parent aerodrome and a radio-controlled pilotless aircraft . . . fitted with television cameras and other instruments. . . . He observes all that is taking place on the television screen, and attends to the other information signalled back. . . . he cannot see, and has never seen, anything except the screen before him' (pp. 491–2). Many if not most philosophers nowadays—Ryle certainly—reject totally all such epistemological models. This rejection really is total : they do not accept such models and then argue or assume that, fortunately, the nervous system is transparent. Certainly the mechanism is essential : perception could never occur without it.

Certainly it may go wrong: and even when it is working with its usual near-perfection it is still possible for us to make perceptual mistakes (being, for example, deceived by optical illusions or eidetic imagery). But neither of these facts has the slightest tendency to show that we never really see anything (*directly*). We do not look out on the world *through* this mechanism: the mechanism is *part* of us. To explain why so many philosophers now reject as fantasies all such ghost-in-the-machine models would take us far too long.[1] But it must at least be pointed out that this rejection is not based either on invincible ignorance of discoveries in neurophysiology or on a mere appeal to the notoriously fallible pronouncements of commonsense. It rests rather on a constant more or less explicit appeal to common and correct linguistic usage. It is, for example, simply not correct to describe what we should normally call a case of being able to see a tank (when, of course, the suggestion that it is part of an insubstantial pageant or is only an hallucination has been eliminated) as if it was not really a case of being able to see a tank (*directly*): no one in such a situation, if he modestly claims to be able to see a tank, is making any reckless inferences to the forever unobservable; for this is precisely the sort of thing which is *meant by* the expression, 'I can see a tank'. Neurophysiologists have much to teach us about the mechanism without which perception could not happen: but they do not and cannot prove that (*direct*) perception does not occur at all. (In the only sense, that is, which has so far been given to '(*direct*) perception'—i.e. the everyday sense. If—as Smythies maintains—(*direct*) perception does not occur, what is it that he *means by* 'perceiving *directly*'?)

This treatment has necessarily been crudely skeletal and inadequate, presenting just two major objections in harsh and garish outline: but to deal fairly and fully with all the philosophical issues raised would need several entire numbers of the *Journal*.

B

Yet even if we have been right in arguing that this paper is radically misguided, much might be excused if it nevertheless held out prospects of heuristic fertility. But I do not think that it is even intended to offer that sort of theory: the Summary suggests that it is not, that its 'aim . . . is to examine some . . . funda-

[1] But it is perhaps worth mentioning some important papers in contemporary Anglo-Saxon epistemology: in my *Logic and Language*, chapters V (G. A. Paul) and VI (M. Macdonald), and in P. A. Schilpp's *The Philosophy of G. E. Moore* the papers by J. Wisdom and N. Malcolm are both reasonably accessible and extremely relevant. Papers by N. Malcolm in the American *Philosophical Review* are particularly apt to the present physiological variant of this fantasy.

mental assumptions, and to suggest a series of alternative assumptions which give a more coherent account of the universe and the place of conscious mind in it' (p. 477). This enterprise has, I think, been unsuccessful. And partly, surely, because it is so premature. It seems to me—as I have argued elsewhere—that what we need at present in our subject is primarily and above all more experiments and ideas for experiments. We must build up a solid body of experimental fact: both by confirming through repetition the work already done; and by establishing new facts and correlations. Then we shall surely find, as Dr Thouless recently suggested, that 'Either the essential step in thought will have become easy or at any rate the road will have become easy for a future Einstein of parapsychology. Let us, then, do more experiments' (this *Journal*, Vol. 35, No. 657, p. 210).

C

In two recent broadcasts [1] I poured scorn on philosophical sensationalism in parapsychology and argued that it was a mistake to think, with Rhine, that it had metaphysical implications. I should like to take this chance of conceding that, while the errors I tried to expose are indeed errors, the results of parapsychology do have some implications which might be called metaphysical, and that those who consider them philosophically sensational are to that extent right. *First*, ESP while it may not formally contradict any established laws or theories in natural science, does certainly conflict with something more fundamental even than the most basic of these. For it is incompatible with some of the fundamental beliefs—'absolute presuppositions' [2] if you like—still almost universally shared even by contemporary scientists, about the sort of thing which can happen and the sort of law which can apply. These scientific beliefs can be modified by reason and experience, and it is absolutely necessary to have some such beliefs to guide research: so 'prejudices' is not the word for them. Being concerned with the 'ultimate nature of reality' they might well be dubbed 'metaphysical assumptions'. The great Helmholz was expressing one such when he declared, 'Neither the testimony of all the Fellows of the Royal Society, nor even the evidence of my own senses could lead me to believe in the transmission of thoughts from one person to another, independently of the recognized channels of sensation.' [3] This basic belief now has

[1] Printed in the *Listener* for 27 September 1951 and 4 October 1951.

[2] Cf. R. G. Collingwood, *An Essay on Metaphysics*.

[3] Quoted by Professor Michael Polanyi in his 'Scientific Beliefs' in *Ethics* for October 1950. Though he would probably still not approve this paragraph, I owe anything of value in it to his writings, his lectures, and to discussions with him.

to be scrapped ; because ESP does occur. *Second*, as indeed I suggested in my second talk, the scientific handling of ESP phenomena may well call for some revision of, or innovation among, the basic explanatory concepts. We may, for instance, here have to use a new concept of 'cause', perhaps one revised along the lines suggested by Mundle (*Proceedings of the Aristotelian Society*, Supp. Vol. XXIV, pp. 222 ff.). These two facts might well be said to constitute metaphysical implications of ESP, and even to be philosophically sensational.

VI

By C. T. K. Chari

The paper by Dr Smythies in the *Journal* for September-October 1951 merits the most careful attention not only of physicists, biologists, and psychologists, but also of philosophers. I am afraid that philosophical opinion concerning psychical research still lags behind the most informed British opinion. Dr T. M. P. Mahadevan, Reader in Indian Philosophy at the University of Madras, told some of us at a meeting that, during a recent tour of the United States, he happened to mention Dr Rhine's work and the S.P.R. in private conversation with some prominent philosophers and evoked only 'peals of laughter'. I imagine that most of these philosophers lack the candour of Dr Archie Bahm of the University of New Mexico who, in a letter to me dated January 27, 1951, said : '. . . I am still distrustful of "parapsychology"—partly because I am not sufficiently familiar with its findings. . . .' After sketching a tentative theory of time, he added : 'It also leaves open the possibilities involved in parapsychology'. I have been busying myself for some time with a topological generalization of the theories propounded by Dunne and Saltmarsh. A crude outline of my hypothesis may appear in *Mind*. I should like to say something here about the difficulties I have encountered in 'spatial' models of the universe designed to accommodate psi phenomena.

(1) Dr Smythies urges that his hypothesis offers a 'credible' explanation of 'normal' and 'paranormal' facts (p. 500). Ought we to accept 'credibility' or 'probability' as a criterion for evaluating the *theories* of psychical research? *If* we assume that the uniformities established by orthodox physics, biology, and neurophysiology have a 'high probability'—just what the statement means on the theories proposed by Kolmogorov, Doob, Feller, Neyman, Cramér, von Mises, Reichenbach, Carnap, and Jeffreys is another question—*no* theory of psi phenomena sets out with

any 'high probability'. It has been conceded by the best authorities on the subject that it demands a very drastic reconstruction of our system of scientific expectations. But to be conceivable at all, the new system of postulates that we erect must bear some analogy to the existing framework. And if it does, will it go far enough to be really serviceable in psychical research? How formidable is the task of reconstruction may be judged with reference to the 'basic limiting principles' that Professor Broad has formulated.[1] One of them is that 'it is self-evidently impossible that an event should begin to have any effects before it has happened'.[2] I maintain that any attempt to modify or reconstruct (and precognition leaves us no option but to modify or reconstruct) a principle like this necessitates a collateral epistemological inquiry into the 'limits of conceivability'. So far as I am aware, only Mr Tyrrell has paid serious attention to the problem. The perspectives that he has unfolded in his *Homo Faber* [3] must be kept well in view in all our attempts at theory-building. I shall return to this point at the end of my letter.

(2) Dr Smythies makes a great deal of what he calls the 'TNS' fallacy. I quite realize that to anybody who has much to do with neuro-physiology Naïve Realism must appear very naïve indeed. But is it necessarily fallacious? It seems to me that the hypothesis proposed by Dr Smythies involves us in some at least of the difficulties of the older epistemological dualism. How can we know that 'events in our perceptual world follow faithfully the events in the physical world' when the latter, *ex hypothesi*, are never directly accessible? The analogy of the controller in the aerodrome and the radio-controlled aircraft (p. 491) gives us no help here. Perhaps Dr Smythies would like to appeal to the 'isomorphism' of Gestalt psychology. But does it eliminate the epistemological difficulty? I am not at all sure that we can afford to ignore the ingenious reconstruction of Direct Realism attempted by Captain M. M. Moncrieff in his book *The Clairvoyant Theory of Perception*.[4] Professor Price in commending the theory says : 'Perhaps we shall no longer be obliged to suppose, as so many philosophers have, that sense-data or sensa or sensation contents are the only entities we are directly aware of in perception. . . . It is curious that an important and influential school of contemporary philosophers has arrived at a very similar result in an entirely different way, by using the methods of linguistic analysis developed by Dr Wittgenstein'.[5] I agree with Professor Price that Captain Moncrieff's rehabilitation of Direct Realism is worth while. The late

[1] *Philosophy*, 1949, xxiv, 291–309.
[2] Ibid., p. 293.
[3] London, Methuen, 1951.
[4] London, Faber, 1951.
[5] Ibid., Foreword, p. 8.

Whately Carington, as is well known, argued that all material bodies could be resolved without any remainder into fundamental particulars which he christened 'cognita'. I believe that a theory could be worked out along these lines without accepting the kind of neutral monism or logical positivism to which Carington so wholeheartedly committed himself in his later years. We have a wide range of possibilities to explore, even the seeming metaphysical lunacies. It is noteworthy that J. C. F. Zöllner,[1] who was probably the first distinguished psychical researcher to adopt the working hypothesis of a multi-dimensional space, held that it was quite compatible with an extreme Mentalism or Berkeleism. He conjectured that the 'representation of our whole *real corporeal world*' (italics not mine) may have a status not dissimilar to that of the 'hallucinations' evoked in the hypnotic and post-hypnotic states. The 'parable' that Mr Tyrrell developed in his *Grades of Significance* [2] may be far more significant than many of us imagine.

(3) Dr Smythies says (p. 502) that his hypothesis 'provides the organization seemingly required by the activity of the "censor" as described by Soal'. Possibly. But does it account for the peculiar symbolism often associated with spontaneous psi phenomena? My own extended investigation of a case involving ostensible paranormal cognition and ostensible para-physical phenomena (telekinesis and apports) suggested symbolism of the weirdest kind. I found strong indications that the 'spirit communicators' who claimed to be responsible for the phenomena were compound entities formed on the same lines as the 'dream figures' of Freudian and Jungian psychology. My observations lend support to the hypothesis advanced by Dr John Layard.[3] The fact that the cases cited by him came out poorly when judged by stringent evidential standards does not rob them of their very great theoretical value.[4] My evidence (of better quality and obtained in an intimate circle) argues for those queer creatures having 'one foot in the world of reality and the other in a dream . . . worthy of the maddest idealism' to which F. C. S. Schiller referred once.[5] While I quite approve of 'psi' as a non-committal omnibus term for 'paranormal' phenomena, I am by no means convinced that it has a great theoretical advantage over Myers's 'Subliminal' hypothesis. I think it is as likely as not that a reformulation of his hypothesis, perhaps in the language of a non-metricized dynamics of the kind sketched by Kurt Lewin and his followers, will suggest fresh lines

[1] *Transcendental Physics* (Eng. tr. with preface and appendices by C. C. Massey, 3rd ed., Boston, Colby & Rich, 1884, pp. 150–3).
[2] 2nd ed., London, Rider.
[3] *Proc. S.P.R.*, 1944, xlvii, 237–47.
[4] See Dr Wiesner's remarks, *Proc. S.P.R.*, 1945, xlvii, 270–1.
[5] *Proc. S.P.R.*, 1922, xxxii, 145–6.

of experimental inquiry. We may say that a 'boundary' is something in crossing which the phenomena change their character. Psychical research and modern 'depth psychology' suggest, at least as a first generalization, that the empirical ego is a 'boundary' in a complex 'psychological field'. We might adopt a term like 'praeter-conscious' as a generic term for all deep-lying or not ordinarily introspectable mental processes. As we move away from the empirical ego into the praeter-conscious, the laws of orthodox scientific psychology become less and less relevant. By a cautious interpolation and extrapolation we can posit praeter-conscious processes starting with the behaviour data of experimental psychical research. And 'spatialization' of a certain kind is not precluded.

(4) As anybody who cares to read my article 'Time as Minkowski's Fourth Dimension' appearing in the 1952 Annual (January) Number of the Indian *Astrological Magazine* [1] will see, I am not a little suspicious of the attempts made by Dunne, Ouspensky, G. C. Barnard, C. A. Richardson, and others to extract from Relativity suggestions for a theory of precognition. I demur to the sort of view Dr Smythies seems to imply when he says (p. 484) that 'Einstein supposed there to be a four-dimensional space-time continuum containing observers travelling through it'. I do not see that this view is entailed by the mathematics of Relativity, especially if we accept the interpretations put forward by A. A. Robb and E. A. Milne.[2] Even in psychical research, may not *time-relations* be more fundamental than *space-relations* and the latter a manifestation of the former? I am trying to speculate on the possibility.

(5) I turn to a fundamental issue. How far will the 'geometrization' of time take us? Following Professor Broad,[3] I shall speak of the extensive, the relational, and the transitory characteristics of time. All attempts to represent time as geometrical extension and 'passage' as a 'travelling' through it entail a *second* series exhibiting the irreversible relation of *temporal* before-after and the transitory characteristics 'past', 'present', and 'future'. A three-dimensional psyche 'travelling' along the fourth dimension of a

[1] Edited and published by Dr B. V. Raman, Bangalore 3, South India; available at John M. Watkins, 21 Cecil Court, Charing Cross Road, London, and the International News Co., 131 Varick Street, New York City. Notwithstanding his 'occult' interests, Dr Raman has been recently devoting some space to the scientific and philosophical issues of psychical research. See my article 'Fathoming the Deeps of Mind' in the 1951 Annual Number of the Magazine.

[2] My article gives references and quotes Relativists *in extenso*.

[3] *Examination of McTaggart's Philosophy* (Cambridge, 1938), Vol. II, Part 1, Ch. xxxv.

physical space-time will generate relational and transitory characteristics which cannot be assimilated to any or all of the seven *spatial* dimensions postulated by Dr Smythies. This does not mean, of course, that the 'spatialization' of time is worthless in speculation on psychical research. But it does mean that the topology of manifolds alone will not carry us far without *qualitatively new ideas about 'transitoriness' or 'passage'*. I believe that Professor Broad, at the Joint Session of the Aristotelian Society and the Mind Association in 1937,[1] hinted at the need for such notions when he made a distinction between the extra dimensions of *space* postulated by Hinton and Dunne and extra dimensions of *time*. There may be an unfamiliar time in which the distinction between a 'past' and a 'present' is irrelevant but not the distinction between a 'present' and a 'future'.

There is unquestionably an urgent need for theorizing of the rigorous sort in psychical research. But 'rigour', in this domain, may consist largely in discovering the 'limits of assertability'. The muddles about 'survival', for instance, may be just muddles about its 'assertability' in any ordinary language. My approach invites comparison with Mr Tyrrell's. Dr Smythies does not deny, I think, that there may be intrinsic limitations in all speculation on psychical research. He speaks of a psychic mechanism of 'a fabulous complexity, and in part employing principles of which we know nothing' (p. 491). And he admits (p. 500) that 'The nature of the Self remains inexplicable'.

Reply by Dr Smythies

I will try and answer Professor Price's comments first. His first point (p. 538) centres round, I think, my use of the word *hypothesis* which I used throughout my paper in a modified sense of the rather special way in which Dingle employs it. Dingle uses it to mean a pseudo-atom or pseudo-molecule, and gives as a familiar example the planet Neptune between the time that its presence was hypothecated to account for the irregularities in the motion of Uranus and the time it was first seen. He regards hypotheses as being 'potential experiences though they are not actual memories or (in general) representatives. These are known as *hypotheses*. . . . These pseudo-atoms may have all the definiteness and locability of actual experiences, but they are neither memories or representatives'.[2] Thus it would be *logically* possible to observe events in the physical world directly *if* our witnessing Selves could

[1] *Proc. Arist. Soc.*, Supp. Vol. xvi (London, Harrison, 1937), p. 203.
[2] Herbert Dingle, *Through Science to Philosophy* (London, Oxford University Press, 1937), p. 165.

leave their place inside the head of the perceived body, cross the dimensional interface, and then observe in physical space, *if* Selves could then react directly to light. Until someone does this they remain strictly hypotheses (but not 'mere' hypotheses) from which the witnesses are individually cut off by material and spatial barriers, but which we observe indirectly by means of signalling mechanisms.

We might extend Dingle's definition of *hypotheses* thus :

(i) To include the class of all physical objects which are only indirectly observable *via* signalling mechanisms. A sub-set of this class comprises the set of hypotheses in Dingle's present sense. These have not yet been indirectly observed, but their presence is inferred to account for the indirectly observed behaviour of other objects, and it is supposed that it will be possible to observe them indirectly at some future date and under certain special conditions.

(ii) To include the class of all objects which (it seems probable) will never be even indirectly observable in the nature of things, but whose presence we infer to account for the correlation between directly observed events (i.e. sense-data) and brain events. This class includes the intermediate parts of those psychical mechanisms connecting the field of direct observation[1] with the brain, the events at the proximal surface of which mechanisms we inspect or observe directly as sense-data.

We might term these hypotheses of the first, second, and third degree (or term) respectively. Third degree hypotheses border on postulates in Dingle's sense.

Taking Professor Price's next point (p. 538) I should have said in this passage that the signalling mechanisms of the nervous system and psychical system are between the observer and the *outside* physical world. The afferent function of the nervous system may be to fashion a mnemically organized model of the internal and external environment to form the target for $\Psi\gamma$.

I must apologize for my error, which Professor Price notes next, in locating the psychical mechanisms in *perceptual* space. Only the proximal surface of any such mechanisms, which actually present sense-data, can be located in perceptual space. The rest of the individual observer's own mechanism would then be hidden from his own direct observation, just as the inside of a television set is obscured by the screen. The whole of other people's psychical mechanisms would then be outside his range of

[1] I take perceptual space to *be* the spatial sense-field open to inspection or direct observation. It is the space system in which sense-data are extended. Would a better term for this system be *inspectual* space, since it is the space system in which inspection (in Broad's sense) takes place? If so, what I have called the perceived body would be known as the *inspected* body.

indirect observation hidden behind a dimensional interface, as his own mechanisms would be hidden from their sight. Perceptual space is strictly limited to the confines of the perceived body and the visual screen demonstrated by after-images and the stroboscopic patterns, and to the limits of mental imagery and the 'thereness' of sounds. The rest of visual space may be illusory. The unobservable volume of space in which perceptual space is embedded might be called *psychical* space. These changes are summarized in the revised postulates of the theory given on pp. 568–9 and answer to some extent, I hope, some of the difficulties that Professor Price has raised. The theory might also be regarded as an extension of Henry More's doctrine of 'essential spissitude'.

With regard to the point that Professor Price makes on page 540 (line 21), I did not mean to imply that the common physical world is not observed at all, but that it is observed indirectly by means of a signalling mechanism. Visual space, or rather that part which is not illusory, and tactual space, which is the space occupied by the perceived body, are different locations in perceptual space. When I suggested that $\Psi\gamma$ and $\Psi\kappa$ are physical forces, I meant that they may prove detectable by instruments of suitable design. 'Trans-dimensional' forces would, I agree, be a better term.

One reason for my 'surprising' version of Descartes' philosophy, which Professor Price mentions, and for the possible distortions of the implications of relativity theory, to which Dr Thouless and Mr Chari draw attention, is that I have learned about these systems of knowledge through their interpreters. This has been regrettably necessary owing to the size of the field I have tried to cover and to the mathematical difficulty of relativity theory. For Descartes I have relied largely on Burtt, and for relativity on Eddington and Jeans. If perceptual space is regarded as being a direct cross-section of physical space-time, as Jeans seems to suggest is implied in relativity,[1] is that not the TNS theory?

I have been in touch with Mr Warner Allen since the publication of my paper and I now see that I was mistaken in attributing to him the TNS fallacy. James's 'Chamber of Consciousness' should, however, I think, be attributed with spatial extension. It seems to have more than the merely temporal extension with which Mr Warner Allen attributes it in his works. I must apologize for my misinterpretation of his views.

To pass on the main epistemological difficulties that have been raised. These may be summarized as follows:

[1] Sir James Jeans, *Physics and Philosophy* (Cambridge University Press, 1942), pp. 63–9.

(i) How is it possible to gain accurate information about one series of events (i.e. physical events) by observing a second series of events (i.e. experiential events or sense-data) occurring at one end of a signalling mechanism the other end of which is connected to the second series of events, the whole arranged in such a way that the first set may be said to represent the second, when it is impossible ever to observe the second set directly?

(ii) How can it be possible to know that the first set is giving an accurate representation of the second set and indeed that the second set exists at all?

Such a fundamental question as this can hardly be dealt with adequately in the space available, so I can only attempt a brief defence of the representative theory. I would answer the first objection by saying that perceptual situations of this nature, though at a lower level, play an increasing part in modern life. When I perceive a fluctuating series of grey and white dots on my television screen I do not limit myself to an account of the electronic behaviour of my set. I assume that I am perceiving, for instance, a game of cricket at the Oval, and thus am gaining a lot of information and knowledge that I would not otherwise have obtained. It is then only necessary to postulate that my sense-data, as I inspect them (in Broad's sense), representing the screen of my set and the events occurring there, bear the same type of relation to the actual screen and its actual events as these latter in turn do to the actual cricket match at the Oval. In the latter case the signalling mechanism is formed by light, television camera, transmitter, and receiver : in the former case it is formed by light, eye, optic nerve, brain, and I would add $\Psi\gamma$ and psychical mechanism. This analogy with television is in fact more than an analogy, as recent work in neurophysiology supports the view that the actual mechanisms concerned in visual perception function along lines very similar to television. As Grey Walter [1] has said, 'the televisual system behaves very like the neuro-visual one'.

It may be objected that this postulated relation between sense-data and physical events cannot be checked directly as can the relation between the television set and the cricket match. This is, in fact, the second objection given above. There may be various ways of replying to it. In the first place, we do not always know if anything does correspond in the physical world to certain experiences (for instance, some kinds of visual hallucination induced in normal subjects under hypnosis) if we are restrained from

[1] 'Features in the Electro-physiology of Mental Mechanisms' in D. Richter, ed., *Perspectives in Neuropsychiatry* (London, Lewis, 1950), pp. 67–78 ; see also C. T. Morgan and E. Stellar, *Physiological Psychology* (New York, McGraw-Hill, 1950), pp. 593–4.

making more complex observations (looking for shadows, for example—that is, making fresh perceptions for the purpose of making observations from which inferences may be drawn) and if we are not allowed to touch the object (i.e. checking by using another sensory path). As E. A. Burtt [1] points out, we do not check doubtful perceptions by making fresh observations in a new manner on the physical objects themselves, but by making fresh perceptions or observations in the old manner. At any rate, we know soon enough when events in the perceptual world cease to follow the events in the physical world to any severe degree, and hallucinations and illusions develop, unless we lose insight. In the latter case our behaviour will very largely be determined by the events in perceptual space, as a study of schizophrenia shows. The basis of the madness of a schizophrenic is not that he has 'lost his reason' but that he ceases to realize that the extraordinary events he is experiencing are occurring in his own perceptual world only and consequently behaves as though they were occurring in the public physical world also. There are, of course, distortions of reasoning in schizophrenia—the thought disorder and the peculiar symbolism —but the schizophrenic remains a moderately reliable witness for the phenomena he is experiencing.[2] This may be better understood if one experiences oneself a short artificial schizophrenic-like psychosis such as is produced by the alkaloid mescaline. In any signalling mechanism 'false' information may be inserted at any level, but it remains information for all that. Its falseness is merely a relative quality. It can tell us nothing about the objective of the signalling mechanism, the system at which the mechanism is directed, but such interference (e.g. hallucinations) can tell us a great deal about the signalling mechanism itself and the environment of the mechanism, if this should be more extensive in any way than the system comprising the objective of the mechanism and the distal end of the mechanism itself. *All* experiences, including schizophrenic ones, must be correlated.

The mode of presentation of our picture of the external world, and certain aspects of our knowledge of it, have been built up by many years of subconscious learning along the lines described by J. Z. Young,[3] in which the mode of action and electronic behaviour of the mechanisms of the brain have been radically changed. Our knowledge of the external world has also been built up, in the child

[1] *The Metaphysical Foundations of Modern Physical Science*, 2nd ed. (London, Routledge & Kegan Paul, 1932).

[2] See, for example, Thomas Hennell, *The Witnesses* (London, Peter Davies, 1938).

[3] *Doubt and Certainty in Science* (London, Oxford University Press, 1951).

as in the race, by conscious learning and by 'logical processes of construction and hypothesis, and by inferences therefrom'.[1] By the time we reach adult life these two processes have established the condition where, by the former process, the sense-fields are presented in an orderly manner, and we can gain meaning from what we inspect. When these mechanisms go wrong, or where they have received no instruction, the sense-fields are presented in a disorderly and confusing manner. In cases reported by J. Z. Young [2] and Paul Schilder [3] of patients who are restored to sight following congenital blindness, the visual field is just a confused mass of colour in which no objects are perceived for several months while the electronic mechanisms transmitting the patterns of vision are *learning*. By the logical process of construction, etc., we gain the idea of a physical world which may be supposed continually to feed information into the manifold inputs of the machine, of which one set of manifold outputs *form* the perceptual world. Dobbs has dealt with this question with clarity in the article already referred to. He states that all knowledge of physical events, and thus of processes in physical objects, is inferential and never direct knowledge. The only change I would suggest in his account is that the one-to-one correspondence between experential events and neural events is not gained though coincidence in space but by connexion by signalling mechanism. Experiential events and their antecedent neural events are geometrically entirely incongruous.

May I now answer some of Mr Mundle's points.

(i) It is not I who am responsible for the notion that Direct Realism has been rendered untenable by neurophysiology.[4] I have quoted the eminent authorities in this field upon whose deductions I have based my arguments—E. L. Hutton and Sir Charles Sherrington. To state that 'the objects of his study have their existence only in him', and 'accepting finite mind as having a "where" and that "where" within the brain' is surely to refute Direct Realism.[5]

I am not suggesting that the function of the nervous system is

[1] H. A. C. Dobbs, 'The Relation between the Time of Psychology and the Time of Physics', *British Journal for the Philosophy of Science*, 1951 ii, 122–41.

[2] Op. cit., pp. 61–6.

[3] *Brain and Personality* (New York, International Universities Press, 1951).

[4] The sense in which I use this includes the findings of neurology, neuropsychiatry, and experimental psychology (parts of).

[5] See also Russell Brain's criticisms of Direct Realism in 'The Neurological Approach to Perception', *Philosophy*, 1946, xxi, 133–46.

either 'selective' or 'creative' but mainly transmissive (with subsidiary subconscious functions of control and communication). Grey Walter [1] has said, 'The basic concept which runs through the new approach to brain and mind is that the brain is an organ for handling signals.' It is perhaps an advantage for this theory that it entails the minimum change in the current theoretical position in neurophysiology, and, I think, does not clash with any facts of neurophysiology. The changes I am suggesting are mainly additive.

I do not assume that the function of the optic nerve and brain 'must be to create private mind-dependent entities'. I suggest that these latter are created by the mechanical part of the spatially independent psyche. The total psyche-brain mechanism would then be both transmissive, creative, *and* contain internal focussing devices to aid the direction of attention. The brain may be one half of Sherrington's telephone exchange. The subscribers may inhabit the other half. I can see little justification for supposing that we observe events in the physical world directly, in order to persuade ourselves that there is such a world, when all the evidence from neurology, neurophysiology, neuropsychiatry, and experimental psychology indicates, to an overwhelming degree, that we do not observe physical events in this fashion.

(ii) I have already to some extent dealt with Mr Mundle's second point. The relation between A and B is given by postulating that they form together an n-dimensional continuum. On page 492 of my paper I said that they may be non-coincident. That is not to say that they do not have any spatial relation to each other. They have the spatial relation of non-coincidence. The intimate relations that exist between our minds and our bodies may be accounted for by supposing that the body and the psyche (including the Self) form together a single and unified organism.

Mr Flew states firmly that it is a mistake to use the word 'mind' as though it referred to an object, as does the word 'brain', and that his opinions are based on 'common and correct linguistic usage'. I feel, however, that common linguistic usage can hardly be held to be sufficient authority for deciding fundamental issues in cosmology. No one can possibly claim to know whether events do or do not occur in higher-dimensional space and whether or not these events have anything to do with human beings. These questions can only be answered by observation and experiment. I have no objection if the phrase he finds most noxious in my article be changed to '*People* are able to abstract information, etc.' In that case, it is necessary to postulate that a person comprises a

[1] *Perspectives in Neuropsychiatry*, p. 69.

body and an X. The particular label you attach to X does not seem to me to be as important as Mr Flew claims ; though, of course, it avoids misunderstandings if the same term is used in the same sense by everyone who uses it. X may be in part, or perhaps wholly, an organized and material entity extended in a space of a different dimensionality to that in which the body is extended. I suggest that *psyche* is a good name for it. Part of the psyche seems to divide naturally into Self and not-Self, the observer and what is observed, the thinker and what is thought.

Mr Flew admits that he possesses a mechanism by the aid of which he perceives the external world. It is, he says, part of him. Where then, in the world that he perceives, is this mechanism located? To sustain his case he must suppose that it is located inside his perceived head. If so, then it must be transparent since his observing Self is presumably inside the semi-liquid mass of his brain encased in an opaque and solid skull. If, however, he supposes that his perceived skull and body are inside the mechanism, as Hutton suggests, then he is propounding the representative theory of perception at present widely held in neurology, where perceived events *are* electron patterns in the brain. My theory is only a variant of this latter theory where a part of the mechanism is cut off from the brain by 'a great gulf fixed'. It is interesting to note that Moncrieff, in his ingenious attempt to resurrect Naïve Realism, was forced to place the point of observation in the cavity of the eye-ball behind the transparent cornea, aqueous humour, crystalline lens and vitreous humour, and in front of the opaque retina, sclera, optic nerve, etc.[1] It seems to me that until someone can construct a detailed theory of brain function which can account for all the determined facts of neurology and allied disciplines and can yet support Naïve Realism, the only three defensible theories of perception are those given by Russell Brain in his article in *Philosophy* to which I have already referred.

Mr Flew constructs his theories by a 'constant more or less explicit appeal to common and correct linguistic usage'. How does Mr Flew know that common linguistic usage is in fact correct? Language is merely the system of inter-observer communication and clearly cannot be used as the sole basis for an infallible theory of perception, mind, or anything else, since it will inevitably embody and reproduce any mistaken ideas that these observers may entertain, and any mistaken opinions that they, as fallible human beings, may form of their own nature. The mere argument that we all mean the same thing when we say 'I see a tank' is really not a sufficient indication that Direct Realism is a

[1] M. M. Moncrieff, *The Clairvoyant Theory of Perception* (London, Faber, 1951).

true theory. We would be equally in agreement if a representative theory were true, as Hutton points out in the passage I quoted from her work in my article.

Mr Flew seems to me to give words an undue importance relative to the entities that words are the labels we use to describe. His philosophical criteria could not, for example, today be used to support the Ptolemaic concept of the universe. This is because science has progressed and common linguistic usage has changed drastically in its train. Five hundred years ago, if Mr Flew's system had been applied to astronomical matters, we would have discovered the truth that the earth lay at the centre of the universe. It seems doubtful whether this system can be decisive in answering the more difficult questions of the human mind and soul.

It is generally agreed that, while the facts of parapsychology do not need any further experiments to establish them, they do need a vast number of experiments to discover more about them. But, as Plesch,[1] among others, has pointed out, there is need for a theory to account for them, a theory which may be tested by further experiments. Mr Flew asks in his first paragraph how objects as elusive as psyches may be detected. This may be done by detecting the postulated and necessary influences they may exert on material systems in physical space. Electrons are unobservable for another reason. They are too small. But their behaviour can be followed by using such devices as Wilson's cloud chamber. We require analogous devices for investigating psi-fields.

Mr Stevens wonders why I did not make any further reference to the theory of the psyche that he favours ((i) on p. 500). I had already pointed out its shortcomings in the first section of my paper. I do not unconsciously assume that 'there must be a mind around the place somewhere'. I have suggested an exact formulation for this 'whereness' of the entity that might well be called 'mind', though I would agree that it is better to call this additional organ the psyche. In an article in the *Journal of Parapsychology* [2] Mr Stevens says, 'Those who study behaviour in relation to brain structure . . . have endeavoured to observe the activity of the whole organism in its environment . . .' (p. 130) and 'we would deal with the function of the organism as a whole' (p. 132). It is a very bold assumption to hold that the body and brain of a man is the whole organism and that the physical world is his total environment.

I should like next to deal in more detail with a most important

[1] P. H. Plesch, 'Psychical Research as seen by a Physical Chemist', *Jnl. S.P.R.*, 1950, xxxv, 272–83.

[2] 1950, xiv.

point : the relation of the perceived body to the physical body. I am suggesting that they ought to be differentiated under the determinable of location in space. I do not think that anyone would deny that the perceived body is extended in space. Russell Brain [1] has stated, 'In our awareness of our own bodies we are directly aware of a three-dimensional object.' The question then immediately presents itself, 'What is the necessary spatial relation between the perceived body and the actual physical body?' There are three possible replies :

(i) The perceived body is coincident in space with the physical body. (This is the almost universal view of common sense.)

(ii) The perceived body is coincident in space with the body-image in the brain of the physical body. (This is the current position in neurology and allied disciplines, though it is not usually stated in this form. It is usually left implied, so deeply rooted are our common-sense notions.)

(iii) The perceived body is made of mind-stuff and is spatially independent of any part of the physical body.

The neurological and neuropsychiatric evidence must make us very doubtful of (i). The perceived body can change its shape and size quite independently of the state of the physical body and does this in cases where the mind is quite clear, and the judgement unclouded. The best examples may be found in the phenomena of 'phantom limb' and in people under the influence of mescaline. One of our subjects, who was at the time in a state of observational integrity, experienced the sensation that his perceived body executed a series of complete turns from the waist down around its longitudinal axis. He described it as being a most alarming sensation. As he said later : 'It felt just as though I was being wrung out like a sponge. I could never have imagined the experience without having taken the drug. It was quite foreign to me.' Surely it is not possible for a body with its lower half reversed to be coincident with the physical body which of course cannot execute such movements? Mescaline interferes with the biochemical processes in the brain that support the electron patterns that delineate the body-image in the brain. It may even cause the perceived body to disappear altogether, and to be replaced by a humming feeling. All that has happened is that the electronic arrangements conducting the patterns of bodily sensation have been 'scrambled'.

In (ii) the difficulty is that the perceived body is not the same shape as what appears to be the body-image in the brain. This latter is upside down, split in half, and grossly distorted, and the parts

[1] *Philosophy*, 1946, xxi, 142.

rearranged.[1] These difficulties may be overcome by advances in physiology, but I do not think that anyone will ever be able to fit the perceived body into the brain with any degree of plausibility.

I am suggesting that the third possibility may be the true one.

As a tentative lead in the experimental investigation of this theory, I should like to suggest that the extraordinary behaviour of Ehrenhaft's dust particles [2] may possibly be due to the fact that they are reacting to the extracerebral 'penumbra' of psi-fields (or Eccles's *mind influences* [3]). Ehrenhaft's system of minute dust particles suspended in a low vacuum in a beam of concentrated sunlight would seem to possess an important property similar to that postulated by Eccles for the 'neurone net' in his development of this concept : e.g. a high degree of 'poise'. They also possess abundant free energy, as does the brain. It is interesting that Ehrenhaft's discoveries were made when he was using an instrument devised to detect minute magnetic forces. It is evident that any physicist investigating the behaviour of such a delicately balanced system, with which psi was in fact interfering, would be led to construct curious theories to account for these phenomena, if he left psi out of his range of possibilities. Ehrenhaft has in fact attempted to account for his phenomena by means of theories with which other physicists disagree violently. I visited Professor Ehrenhaft in March 1951, and am able to confirm Rabel's report from personal witness, and further to suggest that Rabel's one proffered explanation for this phenomenon (that it is due to irregularities in the shape of the particles) seems to be untenable since dusts of such widely differing shapes as graphite (flat plates) and sponge sperm dust (globules) may be observed to spin along exactly similar complex paths. Incidentally, the dust particles seem to be tracing out Lissajou figures and a mathematical analysis of these might yield interesting results.

It is also just possible that $\Psi\gamma$ may be responsible for the movement of electrons in the brain that causes the alpha-rhythm (and perhaps other rhythms) of the Electroencephalograph, and also for Rohracher's phenomenon [4]—the minute, constant, and regular mechanical vibration of the human body and the earth at a frequency of about 10 cycles per second.

[1] See M. A. B. Brazier, *The Electrical Activity of the Nervous System* (London, Pitman, 1951), figs. 3 and 4 on pp. 5, 6.

[2] See article by Gabrielle Rabel, 'Matter Moved by Light', *Discovery*, 1951, xii, 151-3.

[3] See the most important article by Professor J. C. Eccles, F.R.S., 'Hypotheses relating to the Brain-Mind Problem', *Nature*, 1951, clxviii, 53-7, which I had not read when I wrote my paper.

[4] Hubert Rohracher, *Mechanische Mikroswingungen des menschlichen Körpers* (Vienna, Urban & Schwarzenberg, 1949).

I also suggest that, if we take into account the facts of parapsychology, the most probable of the three relationships between sense-data and the nervous system that Russell Brain [1] considers is the second: 'A sense-datum is a psychical event unlike the neural stimulus which initiates it and thus doubly removed from the original physical stimulus.' When we change from inspection to perception (both in Broad's sense),[2] we should change the frame of reference we are using. The two frames may be so related that there is at least one axis in each set which is in that set only.

The relation R in Broad's formula o—R—s may be one of connexion by signalling mechanism.

The two fundamental processes in the central nervous system of excitation and inhibition may also extend to the relation between the brain and the psyche. The brain may also have the additional function of exerting a continual *inhibition* over mind-stuff, which may not be a mere passive mediator of sense patterns and will but may possess the potentiality of a fierce life of its own. The natural activity of mind-stuff may be the production of images and pictures of startling beauty, intense poetic integrity, and charged with an elemental significance and meaning. It is possible that this inhibitory function of the brain may itself be inhibited by mescaline. I feel that the phenomena produced by mescaline are of absolutely fundamental philosophical importance.[3] It seems unlikely that visions of such overpowering beauty as mescaline produces, and the extraordinary way in which the drug causes the perceived world to become very much more beautiful, are products of a sick brain. Some mescal visions are the most beautiful things that man on this planet has ever witnessed, so many intelligent people who have experienced these things have alleged. They can only be given an adequate explanation by supposing that they represent the beauty of the soul (in Plato's phrase) gaining partial release from its domination by the brain.

A Revised Set of Postulates (with Notes)

The basic postulate

I. Perceptual space is not coincident with physical space.

[1] *Philosophy*, 1946, xxi, 145.

[2] C. D. Broad, *The Mind and its Place in Nature* (London, Routledge & Kegan Paul, 1923).

[3] See, for instance, A. Rouhier, *Le Peyotl* (Paris, Gaston Doin, 1927) and A. J. C. Wilson, 'Ayahuasca, Peyotl, Yagé', *Proc. S.P.R.*, 1949, xlviii, 353–63.

The subsidiary postulates

II. Perceptual space is part of a larger space system, psychical space.

NOTE. This latter is usually unobservable for the reasons given, but events in it can determine events in both observable space systems.

III. Psychical space is filled with mind-stuff, part of which forms a signalling mechanism between the brain and the observer. The proximal *surface* of this mechanism forms the limits of direct observation.

NOTE. These limits comprise the limits of the perceived body and the visual screen as demonstrated by after-images and the stroboscopic patterns. The limits of auditory space and the space of mental imagery are included but are less definite. The perceived body may for this purpose be regarded as a complex sort of surface.

IV. Psychical space and physical space may be thought of as forming together an n-dimensional continuum, where n may be 4, 5, or 6. These endure in time. If psychical space and psychical time form a continuum, then psychical space-time and physical space-time may form an n-dimensional continuum, where n may be 5, 6, 7, or 8. Thus they may partially intersect or be non-intersecting. The movement of the total human organism through the n-dimensional space-time continuum may divide it into space dimensions and one or two time dimensions.

NOTE.

Two non-coincident and infinite straight lines form a 2-dimensional system.

Two non-coincident and infinite planes form a 3- or a 4-dimensional system.

Two non-coincident and infinite cubes form a 4-, 5-, or 6-dimensional system.

Two non-coincident and infinite hypercubes form a 5-, 6-, 7-, or 8-dimensional system.

V. We must distinguish between

(1) *Direct observation*: the Self's direct view of experiential events or the behaviour of sense-data *made* of mind-stuff, and

(2) *Indirect observation*: the Self's view of the physical world thus obtained.

NOTE. (1) corresponds to our view of the events on a television screen, and (2) to our view of events in the television studio thus obtained.

Notes on general topology

An issue fundamental to the problems of perception seems to be what events are to be regarded as taking place *inside* the human

organism and what events *outside* it. Perceptual space may be embedded in psychical space in that the two are of the same dimensionality. The boundary surface between them is formed as described in the note to postulate III. The boundary surface between psychical space and physical space is a dimensional interface. In this case the topological boundary of the total human organism is formed by the skin and the surfaces of the psychical mechanisms associated with the individual observer. Thus *inside* comprises

(*a*) a portion of physical space inside the skin ;
(*b*) a portion of psychical space containing the psychical mechanisms ;
(*c*) the whole of perceptual space (which is limited in extent).

Outside comprises

(*a*) the rest of physical space ;
(*b*) the rest of psychical space.

Physical space is public : perceptual space is wholly private; psychical space may be public if we all share one or private if we each have one to ourselves. There may be no way of telling.

POSTSCRIPT. Since writing this reply, I have read Professor Broad's *Scientific Thought*. His conclusions on pp. 392–3 and 543–4 are revelant to this theory.

REVIEWS

RELIGION AND THE NEW PSYCHOLOGY. By Alson J. Smith. With Introductions by Dr J. B. Rhine and the Right Rev. Austin J. Pardue. New York, Doubleday, 1951. 192 pp. $2.50.

The New Psychology, for Dr Alson J. Smith, is parapsychology, and he has discovered parapsychology as bringing new hope, 'the hope of the world in this time of crisis', to 'the millions of nominal Christians . . . whose acceptance of the scientific method has shaken their faith'. For 'parapsychology . . . can make religion intellectually respectable and science emotionally satisfying' (p. 6). This enthusiasm, appropriate enough in a good Methodist, has not prevented him from writing a book based upon a very wide knowledge of the history and present position of the subject. And the two Introductions, by the Protestant Episcopal Bishop of Pittsburgh and by Dr Rhine, both much more than formal commendations, should secure his book a reading in both camps. That by Dr Rhine has indeed a note of personal autobiography which gives it considerable importance, and the whole book has the authentic hall-mark of Duke University upon it. The writer has a first-hand and up-to-date knowledge of the experimental work which is going on there, and has had access to the records of

its early successes as well as to the later more carefully controlled experiments in which those successes are now being tested. He has also read widely in the history of psychical research, on both sides of the Atlantic, and with all his enthusiasm gives a by no means uncritical survey of the history from Patience Worth and the Fox sisters to the present day.

His purpose lies in the presentation of the growing rigour of the application of scientific method to fields of enquiry which involve a re-casting of some of the most cherished presuppositions of modern science. Parapsychology is now a scientific subject, but it obviously opens the door to hypotheses for which science has, until lately, found no use. Some of man's oldest intuitions are becoming respectable again, after long years of discredit. Personally I find Dr Alson Smith's theological interpretations a little too enthusiastic. I respect and agree with his intentions, but there are a good many gaps between the findings of parapsychology and his vision for the Church of tomorrow. We are a long way yet from seeing in parapsychology the hope for the re-union of Christendom 'by emphasizing that supernormal element that all denominations have in common', and by the revival of 'religion's ancient faith in man' (p. 174). And a church whose password is not 'Credo' but 'Amo' (p. 175) will in fact have a creed, drawn directly from the New Testament (I John iv. 21, *et passim*), and one which parapsychology has not yet gone very far to affirm.

Real students of parapsychology will, naturally enough, find little that is new in this vigorous survey, and some inaccuracies were inevitable, as in the references to Miss Beauchamp, where 'Sally' is given a second identity, and Doris Fisher, where the more critical survey by T. W. Mitchell would have helped the writer. He also does not know how open to criticism is the evidence for *An Adventure*, though he shows a proper hesitation about it. And some of his accounts of the phenomenal scoring by subjects at Duke University, though true as they stand, need to be read with a caution which those who know something about the later work there will be able to provide, but which may be lacking in the general reader.

But it is a stimulating and a lively book, and I am glad to have read it.

L. W. Grensted

Second Sight: its History and Origins. By Lewis Spence. London, Rider, 1951. 190 pp. 18s.

The focus of Second Sight manifestations seems by definition to be the Scottish Highlands. Mr Spence has collected together a

great number of stories from old sources and claims that the collection is exhaustive up to the end of the eighteenth century. He shows that originally Second Sight was associated with the worship of ancestral spirits.

The most interesting feature of the book is the tracking down of the story material to roots in folklore. Although Lewis Spence believes that Second Sight can be supernormal, 'When ignorant and unlettered folk seek to enhance the circumstances of a tale in order to make themselves momentarily important, they usually fall back upon the stock material of primitive fiction'. This may well 'ring a bell' with the student of poltergeists, particularly the classic cases.

It is unusual in a book of this type to find not a single mention of the Society for Psychical Research or of its publications.

Mr Spence appeals to psychologists to digest and elaborate on the material he has collected, so it is a pity he has not provided an index.

D. P.

MIRACLES. By Olivier Leroy. Bruges, Desclée de Brouwer, 1951. 152 pp.

M. Leroy defines a miracle as 'an extraordinary external event not explicable by any natural cause known or conceivable, and suggesting by its antecedents that its cause is invisible, personal and intelligent'. He gives a number of interesting and well-documented cases which he regards as falling within this definition, especially some cases of faith-healing. In some other cases, readers may feel that the incidents he relates are more easily explicable by normal means than M. Leroy seems to admit. He is, however, commendably cautious in the conclusions he draws, and students of psychical research will agree with him that an incident should not be dismissed as impossible on *a priori* grounds. We should consider all available evidence and determine, if possible, what actually occurred.

H. DE G. S.

JOURNAL OF PARAPSYCHOLOGY, Vol. 15, No. 2, June 1951. Durham, N.C., Duke University Press. $1.50.

Professor Rhine's editorial on Parapsychology and Physics discusses the relation of psi phenomena to physical principles and the part which their study may play in advancing understanding of those problems in biology which defy physical methods of explanation.

The first main article is a shortened reprint of the report of Thouless's experiments on PK which has already been printed in our *Proceedings*.

Two articles deal with Soal's work on reinforcement effects in card-guessing experiments where two successive target cards are the same. Soal's original way of estimating the reinforcement effect was criticised by Professor M. S. Bartlett, and Greville contributes 'A method of evaluating the reinforcement effect'. In a longer article by Pratt, some of the Soal-Goldney reinforcement data is re-evaluated by this and another method. Significant evidence for reinforcement is found.

The most novel and interesting report in the Journal is one by Lyndon and Ronald Rose on 'Psi experiments with Australian aborigines'. Highly significant results were obtained in card-guessing experiments, but no significant results in PK experiments. Both high ESP capacities and PK capacities are supposed by the aborigines to be found amongst a small number of 'clever men'. None of these was tested, but the authors intend to try to get some such subjects in a later investigation.

Mrs Rhine reports a long series of PK tests of the 'placement' type. The total results were not significant, but there are some suggestive indications of relationships within the total series.

Casper reports an experiment on the effect of attitude of subject on ESP scoring. He adopts the erroneous method of comparing the total scores of different kinds of subjects instead of treating it as a problem of contingency in which the numbers of subjects scoring at various rates in different groups are compared. The method adopted systematically over-estimates the significance of any observed difference, and such over-estimation of significance is liable to lead to contradictions between the findings of different experimenters.

ROBERT H. THOULESS

CORRESPONDENCE

ESP AND INFORMATION THEORY

SIR,—I listened recently to a wireless discussion of the results of experiments in psychical research and after I had thought over what I had heard, an idea came to me for an interesting test to be applied to existing data. My suggestion concerns the application of the concepts of the mathematical theory of information.

The results of all the experiments which I have heard described have been analysed without any explicit account being taken of the time element involved. It is true that the effects of varying the rate of presentation in the five-card experiments have been noted, but time does appear as a variable in the statistical analysis. But in the communication of information from one place to another—and the telepathy experiments would appear to be tests of some communication system—time is an essential parameter. In a fundamental paper, C. E. Shannon has shown that the physical properties of a channel place an upper limit on the rate at which information can be transmitted through it, and that this limit is independent of the form the signal takes. It is thus of interest to determine whether the same sort of limitations apply to the psi channels.

The starting point of information theory is the setting up of a numerical measure of amount of information, and the unit now generally adopted is the binary digit—the information contained in the correct choice from a pair of equally probable alternatives. The next step is the determination of the *a priori* probabilities p_n of the possible messages. The *a priori* 'entropy' of an ensemble of possible messages is defined as the sum of $-p_n \log_2 p_n$ over the whole ensemble. When a message is received unequivocally, the *a posteriori* probability of that particular message becomes unity and that of all the others zero. When it cannot be assumed that the received message is correct, i.e. that it is the one transmitted, our *a posteriori* knowledge can be expressed only as a new set of probabilities p_n' calculated from experience of receiving a number of messages. The average information contained in a message is the difference between the *a priori* and *a posteriori* entropies. In the first case quoted above—where the message is received unequivocally—the *a posteriori* entropy is zero, so the average information in a message is directly measured by the entropy of the ensemble from which the message is selected.

In the five-card experiment the *a priori* probability of each elementary message is 1/5. Let us denote the probability of the received message being correct by $(1/5+x)$. If $5x$ is small compared with unity, then it is easily shown that the average information in each message is $2x \log_2 e$ binary digits. The rate at which information is being transmitted is $2xN \log_2 e$ binary digits per minute, where N is the number of cards exposed per minute.

Now, if the psi channel is saturated, we should expect this transmission rate to be constant independently of how rapidly cards are presented, so that *the excess of the receiver's score above chance should be inversely proportional to the rate at which cards are presented.* To within the limits of the approximation used in this

calculation the excess of score over chance should be independent of the number of alternative cards. It would seem an easy matter, by analysis of existing data, to test whether or not these relationships hold.

The significance of the theory of information would be underestimated if the test were confined to the five-card experiment in its simplest form. If an information rate limit exists, it is independent of the way the messages are coded. For example, if serial correlation between symbols was introduced, the information content of each symbol would be reduced and the number of correct guesses should rise.

E. R. R. HOLMBERG

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